CLAIMS

1.- Dual-band dual-polarized antenna array operating at a lower frequency f1 and at a higher frequency f2, the ratio f2/f1 bein smaller than 1.5, characterized by the physical arrangement of the antenna elements, said arrangement comprising:

(a) a first row of antenna elements aligned along a first vertical axis, said elements being dual-polarized antenna elements operating at said higher frequency f2, the spacing between said elements being smaller than the size of the central wavelength at said higher frequency f2

(b) a second row of antenna elements aligned along a second vertical axis, said elements being dual-polarized antenna elements operating at said lower frequency f1, said elements being spaced the same distance as the elements in the adjacent row operating at frequency f2, said second vertical axis being placed substantially parallel to said first vertical axis at a distance between 0.1 and 1.2 times the longer operating wavelength,

and wherein the positions of the elements operating at f2 are interleaved in the vertical direction with respect to the vertical positions of the elements operating at f1 in such a way that the distance among elements is maximized to minimize the inter-band and intra-band electromagnetic coupling among radiating elements.

2.- Dual-band dual-polarized antenna array according to claim 1 wherein at least one element operating at any of the two frequencies f1 and f2 is shifted horizontally from its corresponding vertical axis at a distance smaller than a 70% of the longer operating wavelength.

3.- Dual-band dual-polarized antenna array according to claim 1 or 2 wherein at least one of said two axes is tilted an angle smaller than 45° with respect to the vertical direction.

4.- Dual-band dual-polarized antenna array according to claim 1,2 or 3 wherein the size of the resonant antenna elements is smaller than a half of the free-space operating wavelength to minimize the electromagnetic coupling between them.

5.- Dual-band dual-polarized antenna array according to claim 1,2,3 or 4 wherein the antenna elements are within the class of space-filling antennas.

6.- Dual-band dual-polarized antenna array according to claim 1,2,3,4 or 5 wherein the antenna elements comprise at least a micro-strip patch element with an space-filling perimeter.

7.- Dual-band dual-polarized antenna array according to claim 1,2,3,4,5 or 6 wherein the operating frequencies f1 and f2 are chosen two fall within the GSM1800 (1710-1880 MHz) and UMTS frequency bands (1900-2170 MHz), wherein the spacing between elements at each of said vertical axis is chosen between 100 mm and 165 mm, wherein the spacing between said two vertical axis is at least 40 mm and wherein the antenna elements are mounted upon a substantially rectangular conducting ground-plane, said ground-plane being at least 140 mm wide in the horizontal direction.

8.- Dual-band dual-polarized antenna array according to claim 1,2,3,4,5 or 6 wherein the operating frequencies f1 and f2 are chosen to be any combination within the set of the bands: GSM1800 or DCS (1710-1880MHz); UMTS (1900-2170 MHz), PCS1900 (1850-1990 MHz) and DECT (1880-1900).

9.- Dual-band dual-polarized antenna for operation within the GSM1800 and UMTS bands according to claim 7, wherein the antenna features a different electrical down-tilt at each of the two bands and wherein the antenna is used in a base-station of a cellular system network to provide coverage in said two bands.

10.- Dual-band dual-polarized antenna array according to claim 1,2,3,4,5 or 6 wherein the operating frequencies f1 and f2 are chosen to be any combination within the set of the bands: GSM900 (890-960 MHz); US Cellular/Qualcomm-CDMA (824-894 MHz); TACS/ ETACS (870-960); ID54 (824-894MHz); CT2 (864-868 MHz).

11.- Dual-band dual-polarized antenna array according to any of the preceding claims wherein the spacing between elements at first frequency f1 can differ from the spacing between elements at second frequency f2 up to a 20%.